

Radiation Report on **AD822 (LDC 0029B)**
Project: Swift XRT

A radiation evaluation was performed on **AD822 Single Supply, Dual Precision, Rail to Rail Low Power FET-Input Op Amp (Analog Devices)** to determine the total dose tolerance of these parts. The total dose testing was performed using a Co^{60} gamma ray source. During the radiation testing, five parts were irradiated under bias and one part was used as a control sample. The total dose radiation levels were 1.0, 2.5, 5.0, and 10.0kRads(Si). The average dose rate was 0.14krads(Si)/hour (0.04krads(Si)/s). After the 10.0krad(Si) irradiation, the parts were annealed under bias at 25°C for 168 hours. After each radiation exposure and annealing treatment, parts were electrically tested according to the test conditions and the specification limits listed in Table III. An executive summary of the test results is provided below in bold, followed by a detailed summary of the test results after each radiation level and annealing step.

All parts passed all tests up to 10.0krads(Si). After annealing the parts at 25°C for 168 hours and 100°C for 168 hours, no significant change was noted in any parameter.

Initial electrical measurements were made on 10 samples. Eight samples (SN's 1, 2, 3, 4, 5, 6, 7, and 8) were used as radiation samples while SN's 9 and 10 were used as controls. All parts passed all tests during initial electrical measurements. All devices were marked AD 5962-9320901MPA Q 0029 B C61350 on top and C61350 Philippines on the bottom.

All parts passed all tests up to 10.0krads(Si).

After annealing the parts for 168 hours at 25°C, no significant change was noted in any parameter.

After annealing the parts for 168 hours at 100°C, no significant change was noted in any parameter.

Table IV provides a summary of the test results with the mean and standard deviation values for each parameter after each irradiation exposure and annealing step.

TABLE I. Part Information

Generic Part Number:	AD822
SWIFT XRT Part Number	5962-9320901MPA
Manufacturer:	Analog Devices
Lot Date Code (LDC):	0029B
Quantity Tested:	10
Serial Numbers of Control Samples:	9, 10
Serial Numbers of Radiation Samples:	1, 2, 3, 4, 5, 6, 7, 8
Part Function:	Op-Amp
Part Technology:	Bipolar
Package Style:	8-pin DIP
Test Equipment:	A540
Test Engineer:	S. Norris

- The manufacturer for this part guaranteed no radiation tolerance/hardness.

TABLE II. Radiation Schedule for AD822

EVENT	DATE
1) INITIAL ELECTRICAL MEASUREMENTS	05/25/04
2) 1.0 KRAD IRRADIATION (0.18 KRADS (Si)/HOUR)	05/25/04
POST-1.0 KRAD ELECTRICAL MEASUREMENT	05/25/04
3) 2.5 KRAD IRRADIATION (0.82 KRADS (Si)/HOUR)	05/25/04
POST-2.5 KRAD ELECTRICAL MEASUREMENT	05/26/04
4) 5.0 KRAD IRRADIATION (0.12 KRADS (Si)/HOUR)	05/26/04
POST-5.0 KRAD ELECTRICAL MEASUREMENT	05/27/04
5) 10.0 KRAD IRRADIATION (0.18 KRADS (Si)/HOUR)	05/27/04
POST-10.0 KRAD ELECTRICAL MEASUREMENT	05/28/04
6) 168 HOUR ANNEALING @25°C	05/28/04
POST-168 HOUR ANNEAL ELECTRICAL MEASUREMENT	06/04/04
7) 168 HOUR ANNEALING @100°C	06/04/04
POST-168 HOUR ANNEAL ELECTRICAL MEASUREMENT	06/18/04
Average Dose Rate = 140RADS(Si)/HOUR=0.04RADS(Si)/SEC	

Table III. Electrical Characteristics AD822 (1)

Test #	Parameter	Units	Spec. Limit		Notes
			min	max	
B1	+Ibias A	pA		25	Bench test
B2	-Ibias A	pA		25	Bench test
B3	+Ibias B	pA		25	Bench test
B4	-Ibias B	pA		25	Bench test
B5	Ios A	pA		20	Bench test
B6	Ios B	pA		20	Bench test
1	Iq 5V	mA		1.7	
2	Iq 15V	mA		1.9	
3	Vos A 5V	μ V	-800	800	
4	Vos B 5V	μ V	-800	800	
5	Vos A 15V	μ V	-800	800	
6	Vos B 15V	μ V	-800	800	
7	+Vo A 5V	V	4.8	5.5	
8	-Vo A 5V	V	-5.5	-4.8	
9	+Vo B 5V	V	4.8	5.5	
10	-Vo B 5V	V	-5.5	-4.8	
11	+Vo A 15V	V	14.8	15.5	
12	-Vo A 15V	V	-15	-14.8	
13	+Vo B 15V	V	14.8	15.5	
14	-Vo B 15V	V	-15	-14.8	
15	avol A 5V	dB	86		
16	avol B 5V	dB	86		
17	avol A 15V	dB	89.55		
18	avol B 15V	dB	89.55		
19	psrr A	dB	69.55		
20	psrr B	dB	69.55		
21	cmrr A 5V	dB	66		
22	cmrr B 5V	dB	66		
23	cmrr A 15V	dB	69.55		
24	cmrr B 15V	dB	69.55		

Notes:

(1) No specification limits were given at the time of testing. The project determined the critical data needed to qualify the devices and the data from these parameters were recorded by hand after each step.